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TORUS RIPPER EVALUATION

File

TEST PROCEDURE

GRAPHS

CONCLUSIONS

RECOMMENDATIONS

DATA

SYSTEM LITERATURE

## TORUS RIPPER EVALUATION TEST PROCEDURE

### I. Sampling and Testing

The following sampling and testing schedule is proposed when the Torus ripper is installed at 20th Street. The testing will be conducted in four phases as follows with tentative starting dates as shown.

Phase I Test & Tune 3/28/78

Phase II Marlboro L.S./K.S. 4/3/78

Phase III Saratoga, Philip Morris, Merit, Menthol 4/24/78

Phase IV Summary of Data, Report, and Recommendations 6/1/78

During each week, the following testing schedule is suggested. The brand tested is indicated by the above time table.

**MONDAY:** Stockton Street Ripper System will be evaluated using 50 boxes of rejects. The ripper shorts generated will be used in the normal manner for Stockton Street ripper shorts. During the day, Monday, 50 boxes of rejects will be sent to Manufacturing Center and held for testing Tuesday morning.

**TUESDAY:** Manufacturing Center ripper system Line 2 will be evaluated using 50 boxes of rejects sent from Stockton Street on Monday. Ripper shorts will be returned to Stockton Street factory as soon as the test is completed, where they will be thermoed and fed into E.T. for Westab. On Tuesday afternoon 50 boxes of rejects will be sent to 20th Street for testing Wednesday.

**WEDNESDAY:** The Torus ripper installed at 20th Street will be evaluated using the 50 boxes of rejects received the preceding day. The ripper shorts will be returned to Stockton Street as soon as the test is completed, each day, where they will be thermoed and fed into Marlboro Blend at 50/50.

**THURSDAY**

**FRIDAY:** Friday is to be an open day in the schedule where retests on any one of the systems can be done if the data is questionable or if for scheduling reasons, the test cannot be done on the designated day.

Testing will be done over a 4-hour period each of the testing days. Samples for cigarette sieve, ripper shorts sieve, moisture, production rate, and paper content. These will be tested at Manufacturing Center Q. C. and

2058087481

and Stockton Street Q. C. Samples will be transported by Q. C. Samples of rejects from the same population of rejects as are being ripped at 20th Street will be ripped at Stockton Street and the Manufacturing Center. The paper from one 4 high stack of rejects ripped at Stockton and Manufacturing Center will be sent to 20th Street for testing. One 4 high stack of rejects will be ripped through the Torus Ripper and the paper caught in a sleeve, weighed. Run through for a second pass and catch all of the good filler and weigh. The same procedure should be used for the sleeve of paper from the Stockton Street ripper and Manufacturing Center Ripper.

At the end of Phase I (Test and Tune) a report will be issued.

Upon completion of testing of Phase II, Phase III will commence to test the ability of the Torus system to rip small circumference cigarettes such as Saratoga. Also the need for clean up after menthol brands and exotic flavor brands will be studied as before.

The temperature and humidity will be monitored daily. Ideal conditions are 72 degrees F. and 60% relative humidity.

## II. RESPONSIBILITIES

### Primary Processing - S/S

Provide a sufficient quantity of reject cigarettes of the appropriate brand for a four-hour sustained run on each of the days scheduled each week. Also to provide for accurate feed in of the ripper shorts into the cut filler. Transportation of rejects to 20th Street and Manufacturing Center and the return of shorts to Stockton Street.

Mr. Roy Haley and Mr. Les Bradshaw will coordinate the number and weight of rejects received at 20th Street and the number and weight of ripper shorts returned to Stockton Street. They will provide a check and balance sheet for all transfer of material.

All ripper shorts from this test will be thermoed when received at Stockton Street and identified.

All ripper shorts from the Torus Ripper will be sent to Westab as E.T. except where there are more than enough for Westab, then they will be added at 50% of the ripper shorts for the brands. Attached is a schedule of the brands to be processed.

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#### QUALITY CONTROL - STOCKTON STREET

Provide personnel for collection of data and samples and expedite their testing. Also he is to monitor the through-put rate of production and be sure there is a continual mix of making and packing rejects ripped.

Sample cigarettes will be made from filler made with 7% ripper shorts from the new ripper at 20th Street at the end of the test and tune period. Also cigarettes will be made with 100% ripper shorts from each location for subjective taste testing, F.T.C. tar, and nicotine content.

#### QUALITY CONTROL - MANUFACTURING CENTER

Expedite the sieve and moisture testing and report data daily as results are available, to Stockton Street Q. A.

#### MANUFACTURING CENTER

Provide operator and support personnel for use during the one day/week test on Line #2 of the ripper system. Also to provide security for rejects when received and expedite the return of the ripper shorts to Stockton Street factory.

#### MANUFACTURING ENGINEERING

Provide the technical assistance necessary to make the previously mentioned modifications and test and tune the system before the start of the test.

### III. SECURITY

Rejects are to arrive at 20th Street and Manufacturing Center and be identified by brand, date. Shorts are to be identified with a card which reads "Ripper Shorts from New Ripper" and the date. It is recommended that the shorts from the new ripper be added at not more than 50% of the total ripper shorts for the brand.

The design of the card for the identification is attached. One card on each side of each stack of rejects and one card in each box.

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#### IV. OUTLINE OF TESTING OF TORUS RIPPER

The following samples will be taken during a four-hour sustained run of the Torus Ripper after an initial test and tune period. All samples will be evenly spaced during the run.

##### SIEVE

5 samples of cigarettes before hopper  
5 samples of ripper shorts (free fall-entire belt width)

##### MOISTURE

5 samples of cigarettes before hopper  
5 samples of ripper shorts

##### PAPER CONTENT

1 5 lb. sample per day

##### PRODUCTION RATE

5 tests per 4-hour run (time to fill 1 box of shorts)

##### TOTAL PRODUCTION RATE

Total lbs. rejects ripped  
Total lbs. shorts produced

##### SPECIAL FLAVOR TESTING

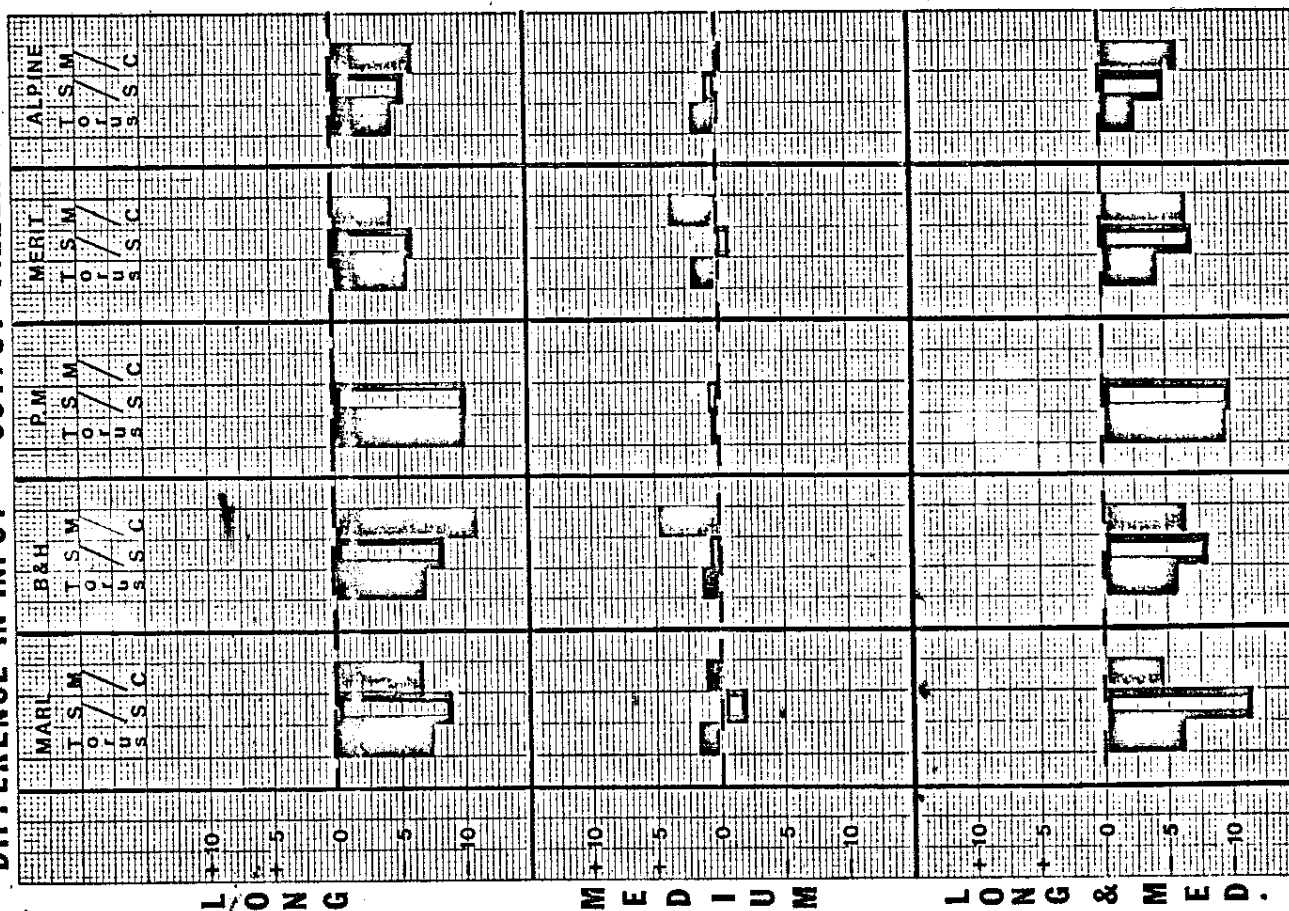
1. Exotic flavors
2. Menthol

##### F.T.C. Tar, Nicotine, and Subjective Taste Tests

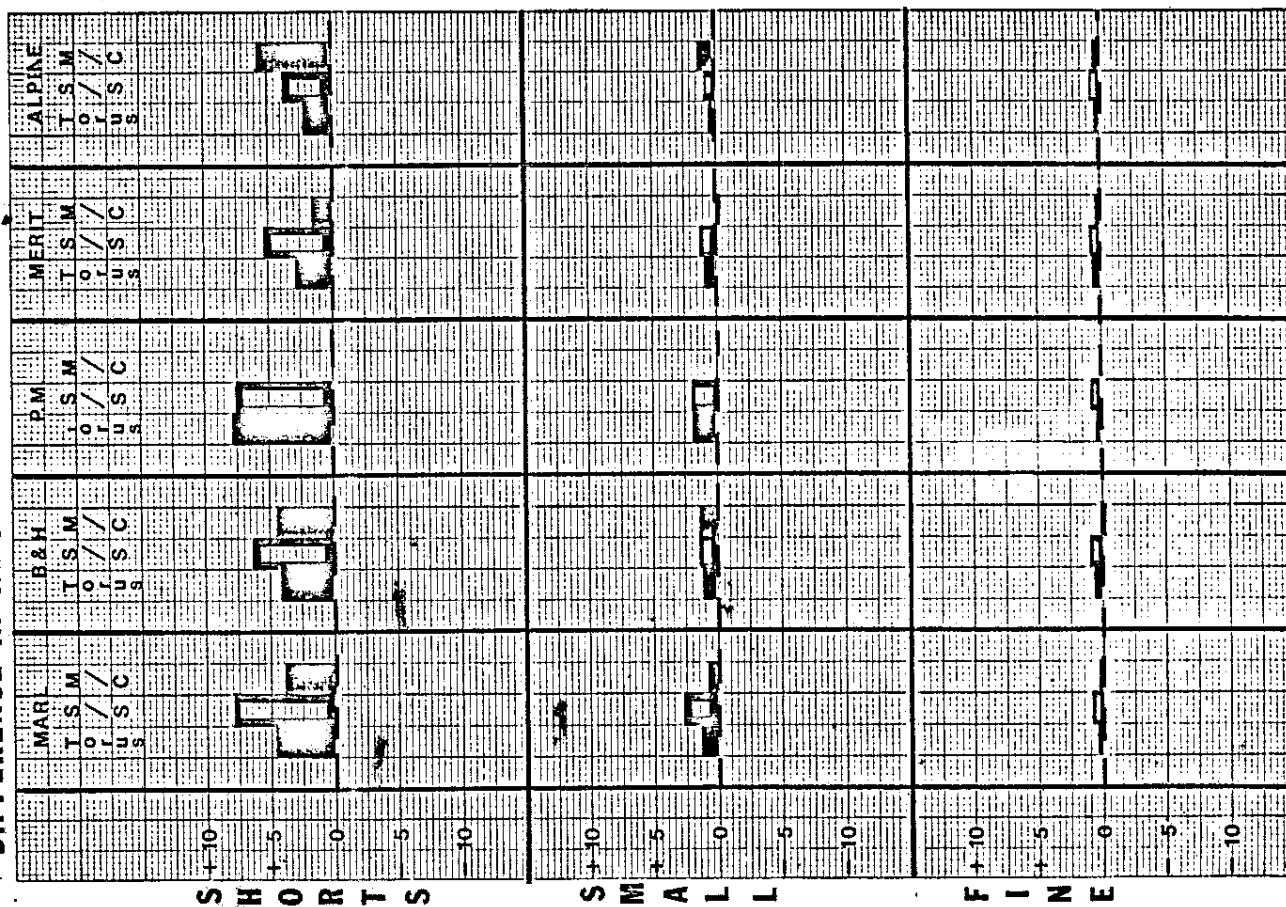
1. One sample made with 100% ripper shorts from each location.

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## DIFFERENCE IN INPUT — OUTPUT FILLER SIZE

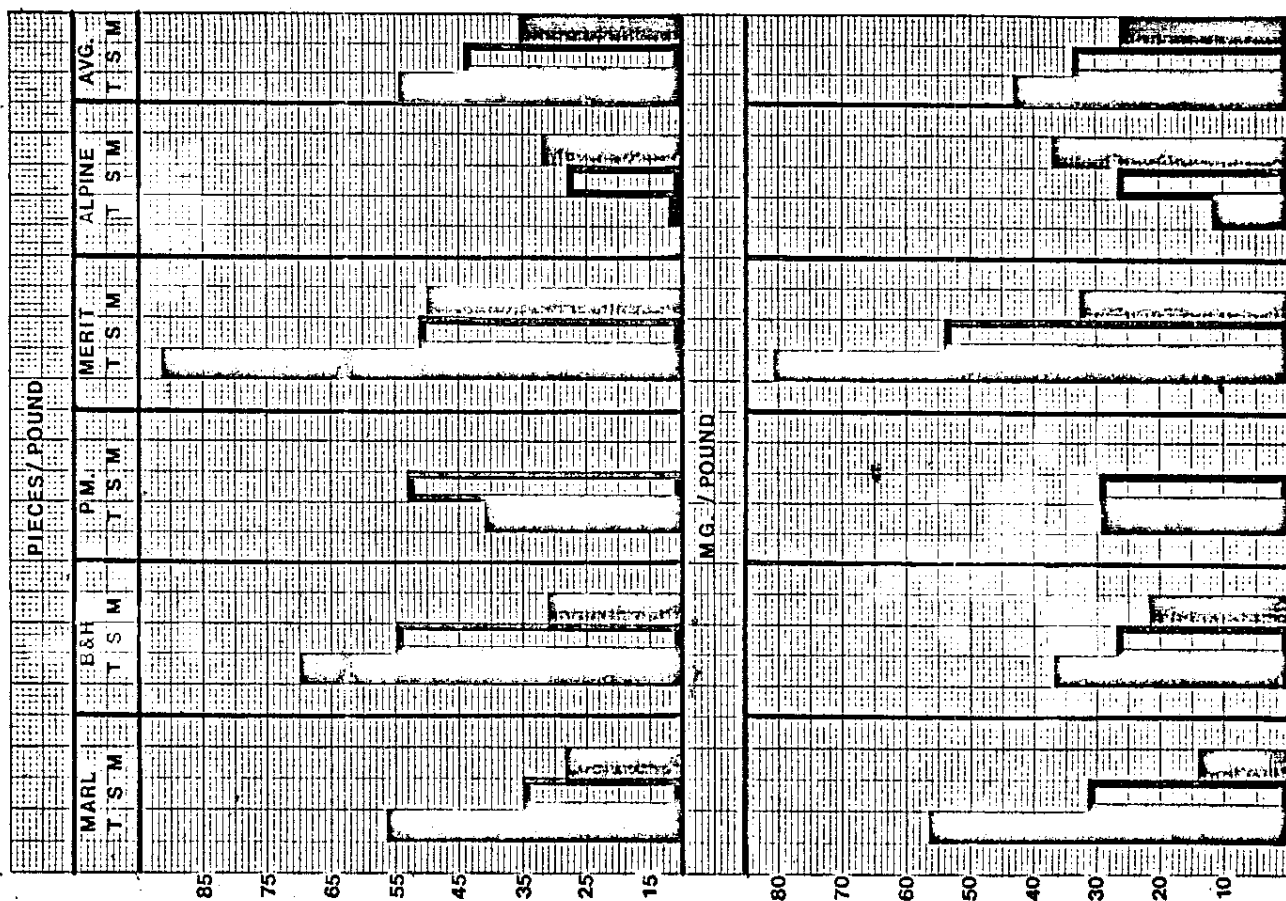


## DIFFERENCE IN INPUT - OUTPUT FILLER SIZE



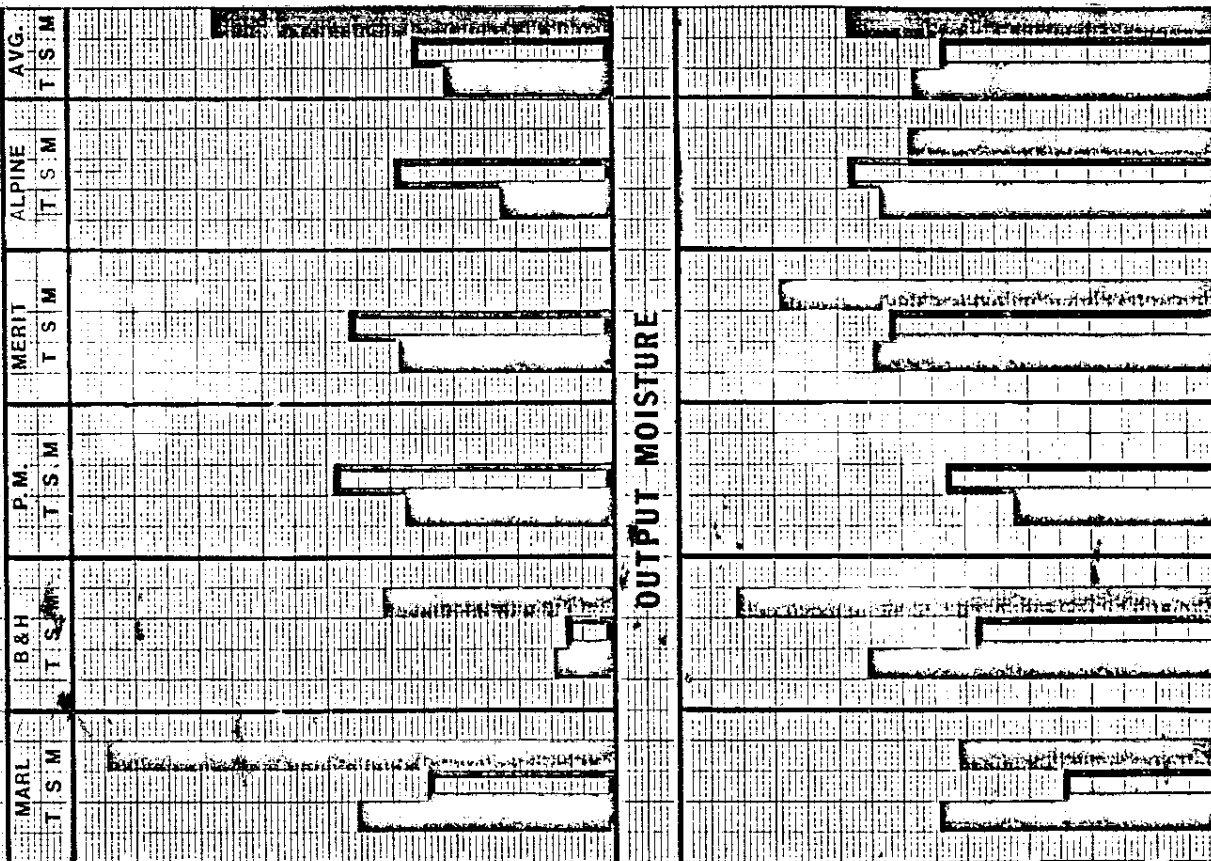


## TRASH IN OUTPUT FILLER

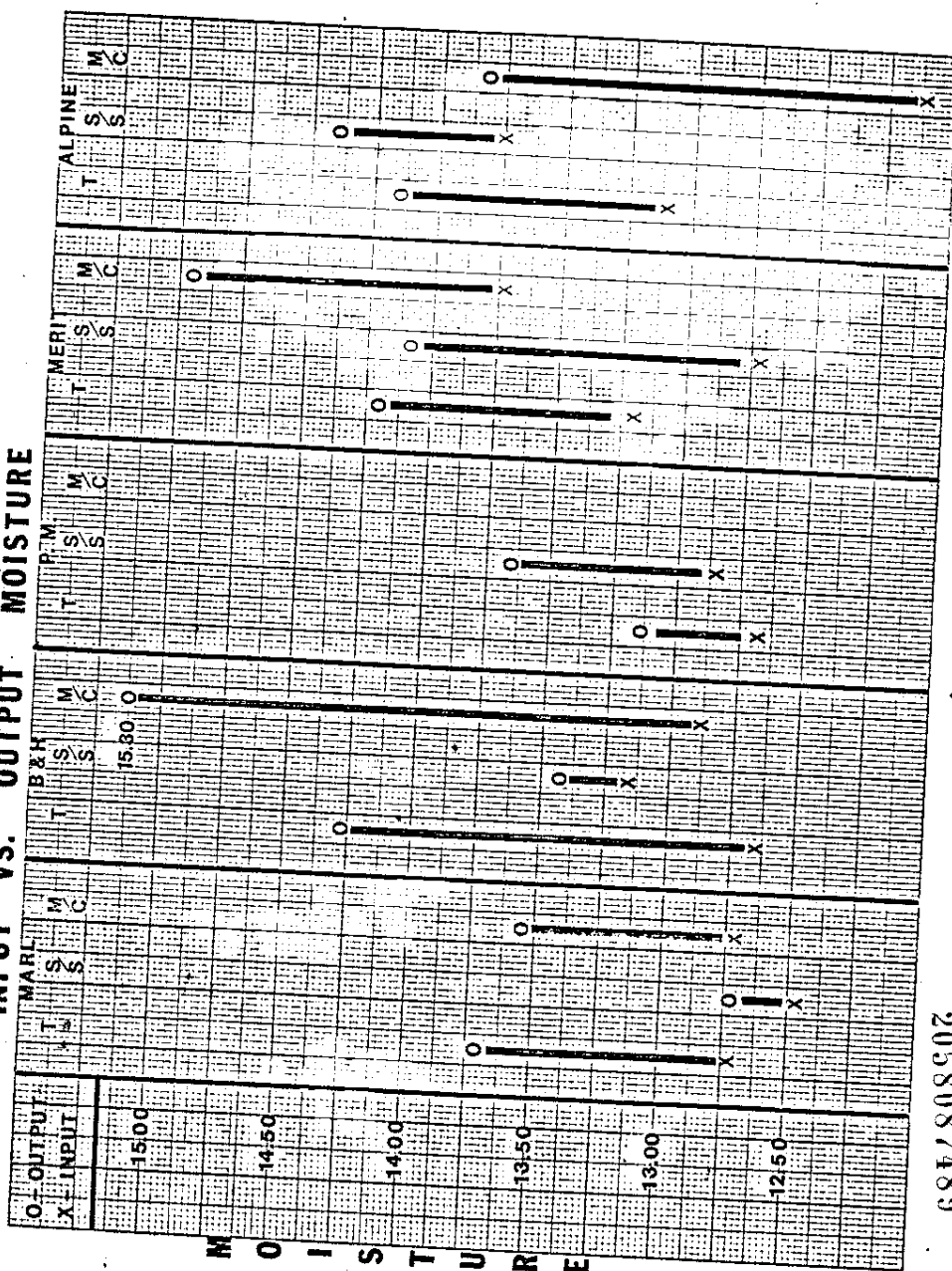


PRODUCT RATE (LBS./HR.)

OUTPUT MOISTURE

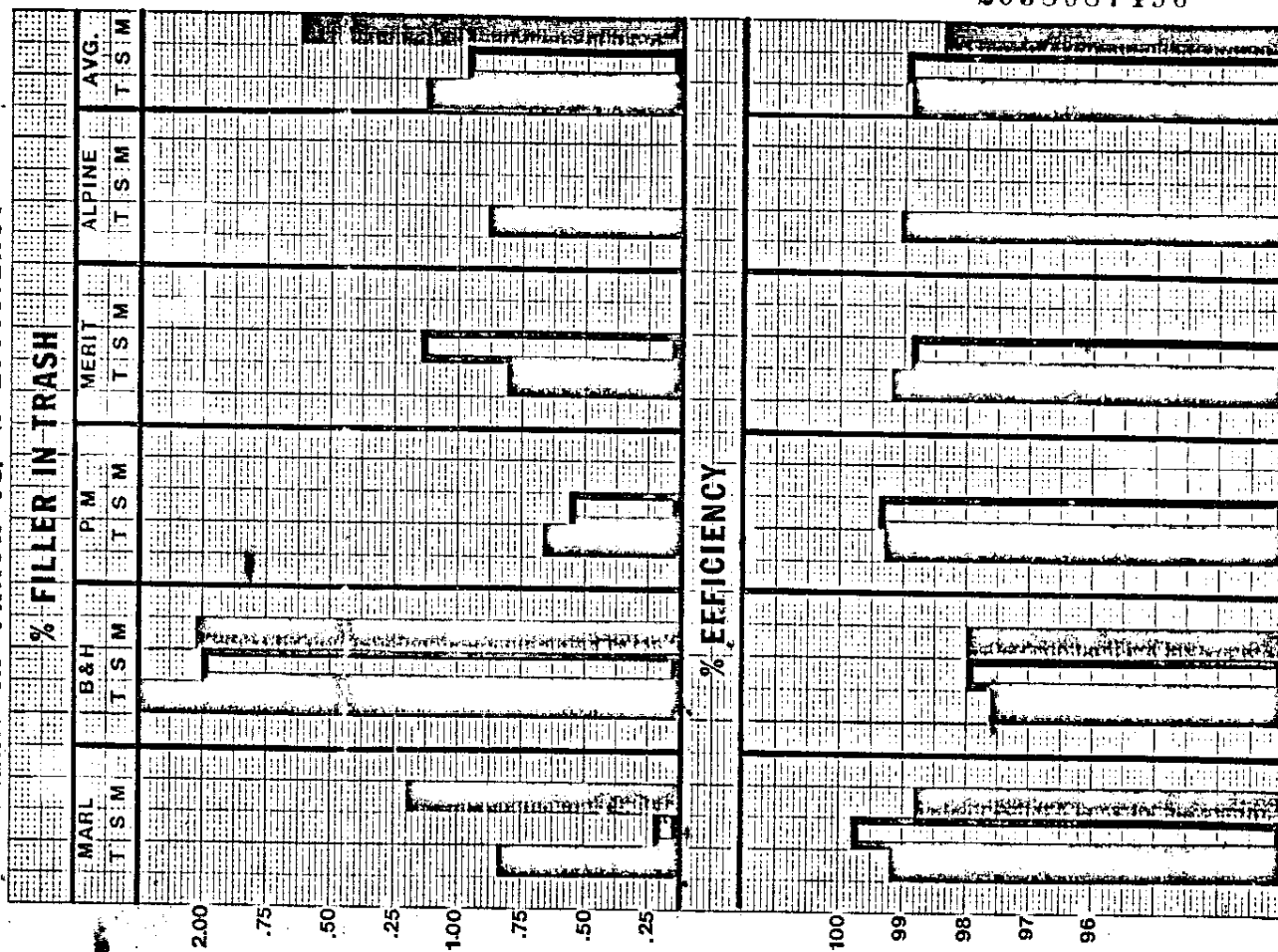


# INPUT VS. OUTPUT MOISTURE



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## % FILLER IN TRASH VS. % EFFICIENCY



## CONCLUSIONS

### I. Sieve Size

- (A) Analysis of sieve fractions performed on Marlboro Rejects showed the Torus Ripper to have less filler degradation when compared to the Stockton Street Ripper and more than the Manufacturing Center Ripper. The significance of this data is questionable due to moisture problems on the Stockton Street Ripper during the Marlboro portion of the testing.
- (B) Analysis of sieve fractions performed on Philip Morris, B&H, Merit, and Alpine shows the Torus Ripper has less filler degradation than the Stockton Street and the Manufacturing Center Ripper. Testing on these brands was limited to one or two test periods. No evaluations were performed on Philip Morris at the Manufacturing Center.

### II. Trash in Filler

The Torus Ripper is the highest in the number of pieces of paper per pound of ripper shorts produced.

The Torus had an average for all brands of 54 pieces as compared to 44 pieces per pound for Stockton Street and 35 pieces of paper for the Manufacturing Center.

The pieces of paper picked from the samples were weighed. The Torus ripper pieces were the heaviest at 43 mg/lb. as compared to Stockton Street at 33.5 mg/lb. and Manufacturing Center at 31 mg/lb.

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### III. Production Rate

- (A) The production rate of Marlboro and B&H rejects on the Torus Ripper was better than the Stockton Street ripper.
- (B) The production rate of Philip Morris, Merit, and Alpine rejects on the Torus Ripper was less than the Stockton Street Ripper.
- (C) The Manufacturing Center Ripper had the highest production rates.

### IV. Percent Efficiency

There was 0.6% range in the percent efficiency of the three ripper systems tested.

### V. Moisture

- (A) The Torus Ripper added 1.03% moisture to the input rejects.
- (B) The Manufacturing Center ripper added 1.55% moisture to the input rejects.
- (C) The Stockton Street Ripper added 0.67% moisture to the input rejects.

A new steam valve and tubing was installed at Stockton Street as a result of the low moisture values obtained on the Marlboro portion of the test.

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#### VI. Effects of Ripper Processing on F.T.C. Tar

Marlboro cigarettes made with ripper shorts from each location and a control were made on the same machine and sent for smoking analysis. There was no significant difference in the F.T.C. tar values when compared to control and target. It should be noted that because of the shorter filler size, the cigarettes were made at a slightly higher cigarette weight to make a cigarette of comparable "feel" to control. No consistent, obvious flavor differences were noted when smoked against control.

#### VII. Residual Menthol

##### (A) No clean-up

- (1) No menthol was detectable in the Torus Ripper.
- (2) No menthol was detectable in ripper shorts from the Stockton Street ripper after 45 seconds.
- (3) No menthol was detectable in ripper shorts from the Manufacturing Center ripper after 90 seconds.

##### (B) With clean-up

- (1) No residual menthol was found in any of the three samples after the normal clean-up.

#### VIII. Exotic Flavor

- (1) No residual exotic flavors were noted when smoked with control Marlboro.

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RECOMMENDATION:

- (1) The Torus Ripper is not recommended for production use until the amount of paper contaminant in the ripper shorts is reduced to the level of that seen in the Stockton Street and Manufacturing Center Rippers.
- (2) It is recommended work continue on the Torus Ripper System to reduce the paper content since the system does have many positive advantages.



BRAND: MARLBORO

I. Sieve	TORUS	S/S	M/C
Input Cigarettes - Long	27.22	25.23	25.37
Medium	50.30	50.41	50.41
Short	19.68	21.09	20.97
Small	2.55	3.00	2.98
Fine	0.26	0.25	0.27
Avg % Moisture	12.73	12.47	12.71
Ripper Shorts Long	19.39	16.00	18.70
Medium	52.01	48.37	52.63
Short	24.36	29.20	24.84
Small	3.69	5.60	3.72
Fine	0.54	0.83	0.33
Avg % Moisture	13.71	12.73	13.55
Degradation Difference in Long and Medium Filler	-6.11	-11.27	-4.68
II. Production Rate			
Lbs. Rejects/hour	2557	2224	3745
Lbs. Ripper Shorts/hour	1940	1709	2841
III. Paper in Filler			
Pcs./# Ripper Shorts	56.7	35.0	28.5
Mgms/# Ripper Shorts	56.8	31.7	14.0
IV. % Filler in Trash	0.84	0.22	1.20
V. Efficiency-100% - % Filler in Trash	99.16%	99.78	98.80
VI. # lbs. processed	22,136	14,159	10,806

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BRAND:SARATOGA 120's

I. Sieve

	TORUS	S/S	M/C
Input Cigarettes - Long	26.34	28.03	31.72
Medium	50.24	49.21	48.73
Short	20.50	20.00	17.05
Small	2.54	2.48	2.12
Fine	0.39	0.27	0.39
Avg % Moisture	12.65	13.16	12.89
Ripper Shorts			
Long	19.27	19.56	20.51
Medium	51.46	49.62	53.52
Short	24.74	26.11	21.56
Small	3.72	3.83	3.60
Fine	0.82	0.88	0.18
Avg % Moisture	14.27	13.43	15.30

Degradation Difference in Long and medium filler	-5.84	-8.06	-6.42
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II. Production Rate

Lbs. Rejects/hour	1635	1586	2443
Lbs. Ripper Shorts/hour	1248	1209	1865

III. Paper in Filler

Pcs./# Ripper Shorts	71	55	31.0
Mgms./# Ripper Shorts	37	27	21.5

IV. % Filler in Trash

2.40	2.00	2.05%
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V. Efficiency-100% - %  
Filler in Trash

97.60	98.00	97.95%
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VI. # Lbs. Processed

5127	2606	2947
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BRAND:PHILIP MORRIS

I. Sieve	TORUS	S/S	M/C
Input Cigarettes - Long	27.11	28.18	
Medium	44.57	50.26	
Short	19.53	19.24	
Small	5.20	2.07	
Fine	3.59	0.25	
Avg % Moisture	12.67	12.85	
Ripper Shorts Long	16.85	17.98	
Medium	45.06	50.42	
Short	27.20	26.81	
Small	7.04	3.93	
Fine	3.84	0.85	
Avg % Moisture	13.14	13.65	
Degradation Difference in Long and medium filler	-9.77	-10.04	
II. Production Rate			
Lbs. Rejects/hour	2335	2680	
Lbs. Ripper Shorts/hour	2207	2553	
III. Paper in Filler			
Pcs./# Ripper Shorts	41.0	53.0	
Mgms/# Ripper Shorts	29.5	29.6	
IV. % Filler in Trash	0.67%	0.56%	
V. Efficiency-100% - % Filler in Trash	99.33%	99.44%	
VI. # Lbs. Processed	2686	2784	

NOT PROCESSED DUE TO LACK OF REJECTS

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BRAND: MERIT

I. Sieve		TORUS	S/S	M/C
Input Cigarettes -	Long	26.32	25.83	26.76
	Medium	50.09	51.44	49.86
	Short	20.12	19.62	20.11
	Small	2.94	2.74	2.80
	Fine	0.53	0.37	0.47
Avg % Moisture		13.20	12.71	13.73
Ripper Shorts	Long	20.51	19.56	21.95
	Medium	51.89	50.57	53.11
	Short	22.98	25.11	21.65
	Small	3.64	3.77	2.71
	Fine	0.95	0.99	0.58
Avg % Moisture		14.22	14.09	14.95
Degradation Difference in Long and medium filler		-4.60	-7.14	-1.56
II. Production Rate				
Lbs. Rejects/hour		2348	2590	---
Lbs. Ripper Shorts/hour		1940	2200	---
III. Paper in Filler				
Pcs./# Ripper Shorts		91.7	51	50
Mgms/# Ripper Shorts		80.8	54.0	32.7
IV. % Filler in Trash		0.81%	1.15%	---
V. Efficiency-100% - % Filler in Trash		99.19	98.85	---
VI. # Lbs. Processed		6128	2596	2600

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BRAND:MERIT

I. Sieve	TORUS	S/S	M/C
Input Cigarettes - Long	26.32	25.83	26.76
Medium	50.09	51.44	49.86
Short	20.12	19.62	20.11
Small	2.94	2.74	2.80
Fine	0.53	0.37	0.47
Avg % Moisture	13.20	12.71	13.73
Ripper Shorts Long	20.51	19.56	21.95
Medium	51.89	50.57	53.11
Short	22.98	25.11	21.65
Small	3.64	3.77	2.71
Fine	0.95	0.99	0.58
Avg % Moisture	14.22	14.09	14.95
Degradation Difference in Long and medium filler	-4.60	-7.14	-1.56
II. Production Rate			
Lbs. Rejects/hour	2348	2590	---
Lbs. Ripper Shorts/hour	1940	2200	---
III. Paper in Filler			
Pcs./# Ripper Shorts	91.7	51	50
Mgms/# Ripper Shorts	80.8	54.0	32.7
IV. % Filler in Trash	0.81%	1.15%	---
V. Efficiency-100% - % Filler in Trash	99.19	98.85	---
VI. # Lbs. Processed	6128	2596	2600

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BRAND:ALPINE/MARLBORO MENTHOL

I. Sieve	TORUS	S/S	M/C
Input Cigarettes - Long	26.00	26.15	21.08
Medium	50.34	50.94	50.39
Short	20.36	19.71	25.08
Small	2.74	2.70	2.89
Fine	0.56	0.51	0.55
Avg % Moisture	13.10	13.75	12.10
Ripper Shorts Long	21.37	20.31	14.80
Medium	52.35	51.72	50.37
Short	22.46	23.46	30.99
Small	3.01	3.47	4.31
Fine	0.82	1.04	0.92
Avg % Moisture	14.15	14.41	13.83
Degradation Difference in Long and medium filler	-2.62	-5.06	-6.30
II. Production Rate			
Lbs. Rejects/hour	1885	2370	3520
Lbs. Ripper Shorts/hour	1429	1806	2680
III. Paper in Filler			
Pcs./# Ripper Shorts	12	28	32.0
Mgms/# Ripper Shorts	11.5	26.5	37.0
IV. % Filler in Trash	.91%	---	---
V. Efficiency-100% - % Filler in Trash	99.09%	---	---
VI. # Lbs. Processed	2549	2671	5620

\* B&H XL Filler Used.

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SMOKING RESULTS  
100% RIPPER SHORTS COMPARISON

Sample	FTC		NICOTINE		RTD		Static		Porosity	
	Del.	Avail.	Mg/Cigt	Total	Plug	Burn	Sec	Circ.	% O.V.	
Control	16.8	27.8	1.50	4.81	3.01	7.4	16	24.95	13.30	
100% Ctr.	16.4	29.2	1.62	5.98	3.13	8.4	16	24.78	13.48	
100% S	16.9	28.8	1.68	6.20	3.04	8.5	16	24.90	12.86	
100% T	17.9	27.6	1.63	6.48	3.04	8.8	16	24.92	13.30	
Target	17.0			4.60	2.75		16	25.00		

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RESIDUAL MENTHOL\*

	<u>S/S</u>	<u>M/C</u>	<u>TORUS</u>
Before Clean-Up			
15 seconds	120	196	
30 seconds	Trace	283	Trace
45 seconds	0	158	Trace
60 seconds	0	106	0
90 seconds	0	0	0
120 seconds	0	0	0
180 seconds	0	0	0

No menthol was found in any samples from any location after clean-up.

RIPPER SHORTS MENTHOL CONTENT

	<u>S/S</u>	<u>M/C</u>	<u>TORUS</u>
Menthol Content of Ripper Shorts*	1687	2802	2217

\*All values in micrograms per gram of filler.

\*\*B&H XL Menthol has a higher initial menthol level than Alpine.

Filler target menthol content for Alpine is 4,000 micrograms/gram.

Filler target menthol content for B&H Menthol is 4,300 micrograms/gram.

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